

REMARKS

In the Office Action the Examiner noted that claims 1-5 are pending in the application and the Examiner rejected all claims. By this Amendment, various claims have been amended. Thus, claims 1-5 remain pending in the application. The Examiner's rejections are traversed below.

Rejection Under 35 U.S.C. § 112

In item 2 on page 2 of the Office Action the Examiner has rejected claim 5 under 35 U.S.C. § 112. Claim 5 has been amended in accordance with the Examiner's comments. It is submitted that claim 5, as amended, meets the requirements of 35 U.S.C. § 112.

The Prior Art Rejection

In item 4 on pages 3-4 of the Office Action the Examiner has rejected claims 1-5 under 35 U.S.C. § 103 as unpatentable over previously cited U.S. Patent 6,459,515 to Bergano in view of newly cited U.S. Patent 6,341,040 to Tai et al.

On pages 3 and 4 of the Office Action the Examiner acknowledges that Bergano does not disclose an interleaver including two input ports and one output port having periodic filter characteristics for each of the input ports. However, the Examiner takes the position that Tai et al. discloses that it is well known to use an interleaver including two input ports and one output port and having periodic filter characteristics for each of the input ports. Further, the Examiner takes the following position that, "...it would have been obvious to an artisan at the time of the invention was made to utilize the interleaver with periodic taught by Tai in the polarization combiner in the system of Bergano. One of ordinary skill in the art would have been motivated to do this in order to reduce the channel crossing interference signals or crosstalk due to narrow spacing between the channels in the high speed, large capacity optical communication system" (page 4 of the Office Action).

The Prior Art

U.S. Patent 6,459,515 to Bergano is directed to a method and apparatus for transmitting an optical signal having a total number of channels that are dividable into a prescribed number

of wavebands. Referring to Figure 1, Bergano discloses a method and apparatus to enable generation of a WDM optical signal having states of polarization wavelengths that are pairwise orthogonal. Referring to Figure 3, an optical transmitter unit 300 multiplexes optical signals of odd numbered wavelengths with a wavelength combiner 307. A wavelength combiner 308 multiplexes optical signals of even numbered wavelengths. Multiplexed light from the wavelength combiners 307 and 308 are provided to a polarization combiner 315 which combines the light from the two wavelength combiners.

Tai et al. is directed to filtering optical channels to provide an interleaver. A multi-plate comb filter is used to separate subsets of channels and to mix subsets of channels. Interleavers are used to increase the band width of an optical network.

Referring to column 5, lines 15-30 which are relied on by the Examiner, this portion of the specification references Figure 6 which states that an interleaver 600 having a three plate optical comb filter, combines odd channels and even channels. The other portion of the specification relied on by the Examiner (column 6, lines 23-55) references Figure 9 which describe interleavers 910, 920 and 930. Interleaver 910 converts from two sets of 200 GHz spaced channels to one set of 100 GHz spaced channels. Interleaver 920 converts two sets of 200 GHz channels to one set of 100 GHz spaced channels. Interleaver 930 converts two sets of 100 GHz spaced channels to one set of 50 GHz channels.

#### The Present Claimed Invention Patentably Distinguishes Over the Prior Art

Claim 1 as amended recites that the “band width of each transmission wavelength band in the periodic filter characteristics of the first input port of the interleaver is narrower than the band width of the transmission wavelength band in the filter characteristics of the first optical multiplexing means, and a band width of each transmission wavelength band in the periodic filter characteristics of the second input port of said interleaver is narrower than the band width of the transmission wavelength in the filter characteristics of said second optical multiplexing means.”

For example, as described in the first paragraph of page 9 of the specification of the subject application, the filter characteristics (Figure 4A) corresponding to the input port  $P_1$  of the interleaver 30, are made so that the band widths of the transmission wavelength bands with the respective odd wavelengths as centers are narrower than the band widths of the transmission wavelength bands in the filter characteristics of the AWG 10 (Figure 3A). Similarly, the filter characteristics (Figure 4B) corresponding to the input port  $P_2$  of the interleaver 30 are made so that the band widths of the transmission wavelength bands with the respective even

wavelengths as centers are narrower than the band widths of the transmission wavelength bands in the filter characteristics of the AWG 20 (Figure 3B).

In accordance with the above-specified relative relationship between the respective filter characteristics of the first and second optical multiplexing means and the filter characteristics of the two input ports  $P_1$  and  $P_2$  of the interleaver, the optical signals having varying narrow channel spacings can be multiplexed while suppressing cross talk.

In contrast to the present invention, neither Bergano nor Tai et al. teach or suggest the relative relationship of the filter characteristics as recited in claim 1. In this regard, even if the interleaver disclosed in Tai et al. would have been combined with the optical signal transmitting apparatus of the Bergano reference, the features of the present claimed invention are not obtained. Therefore, it is submitted that claim 1 patentably distinguishes over the prior art.

### Claims 2 and 3

Claims 2 and 3 depend from claim 1 and include all of the features of that claim. Therefore, it is submitted that claims 2 and 3 patentably distinguish over the prior art.

### Claim 4

Claim 4 is directed to an optical multiplexing method which includes:

using an interleaver having first and second input ports and one output port;

filtering the optical signals multiplexed by said first optical multiplexing step in accordance with periodic filter characteristics of the first input port of said interleaver that include a transmission wavelength band with the wavelengths of odd numbers as centers, and having a band width of said transmission wavelength band which is narrower than the band width of the transmission wavelength band of filter characteristics of said first optical multiplexing step;

filtering the optical signals multiplexed by said second optical

multiplexing means in accordance with periodic filter characteristics of the second input port of said interleaver that include a transmission wavelength band with the wavelengths of even numbers as centers, and having a band width of the transmission wavelength band which is narrower than the band width of the transmission wavelength band of filter characteristics of said second optical multiplexing step; and

multiplexing the respective filtered optical signals to output the multiplexed signal light from said output port of said interleaver.

Therefore, it is submitted that claim 4 patentably distinguishes over the prior art.

Claim 5

Claim 5 is directed to an optical multiplexing apparatus:

wherein a band width of each transmission wavelength band in the first periodic filter characteristics of said first input port is narrower than a band width of a transmission wavelength band in the filter characteristics of said first optical multiplexer, and

a band width of each transmission wavelength band in the periodic filter characteristics of said second input port is narrower than a band width of a transmission wavelength in the filter characteristics of said second optical multiplexer.

Therefore, it is submitted that claim 5 patentably distinguishes over the prior art.

Summary

It is submitted that none of the references, either taken alone or in combination teach the present claimed invention. Thus, claims 1-5 are deemed to be in a condition suitable for allowance. Reconsideration of the claims and an early notice of allowance are earnestly solicited.

Respectfully submitted,

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Date: 7-12-04

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